APPLICATION UNDER UNITED STATES PATENT LAWS

Invention: **SHORT MESSAGE DISTRIBUTION CENTER**

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This is a:

[ ] Provisional Application

[X] Regular Utility Application

[ ] Continuing Application

[ ] PCT National Phase Application

[ ] Design Application

[ ] Reissue Application

[ ] Plant Application

SPECIFICATION

SHORT MESSAGE DISTRIBUTION CENTER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to wireless carriers, Internet service providers (ISPs), and information content delivery services/providers. More particularly, it relates to Wireless Telecommunication, ANSI-41D Wireless Intelligent Network (WIN) applications, and SMTP protocol to manage information content for a wireless carrier.

2. Background of Related Art

There are many "wireless" information content providers in the industry who have some information or service that is considered of value to the mobile phone user. Wireless Carriers are typically in favor of these content providers as they add value to Short Messaging Systems (SMS) and can drive up SMS and voice usage.

Unfortunately, content providers may not fully understand a particular wireless network and/or may not be fully sensitized to particular needs of carriers. This is because the carrier is often seen simply as a 'pipe' through which wireless messages are sent using SMTP protocol. Content providers maintain their own subscriber lists, and typically communicate with carriers merely as e-mail hosts.

All traffic is typically sent through an SMTP gateway, and thus information content, ads, etc., cannot be differentiated from higher priority 'personal' content. Problems arising from this include:

- Bulk information content can slow down and even jeopardize the carrier's SMTP Gateway performance;
- Personal messages cannot be given a higher priority than bulk messages;

- Bulk info content receives the same messaging parameters as personal messages, e.g., delivery receipts enabled, expiration date of 3-5 days, etc.;
- The carrier cannot differentiate between bulk messages among various providers and personal mail for billing purposes;
- Bulk senders deliver their content regardless of whether the device is on, and thus the carrier must handle message storage and retry attempts; and
- Bulk senders will typically continue to deliver content to churned wireless subscribers, wasting network resources and interfering with reuse of mobile numbers.

There is a need for a technique using SMTP and/or other conventional protocols to enable an easy way for content providers to distribute and/or differentiate their information without requiring them to change technologies.

BRIEF DESCRIPTION OF THE DRAWINGS

Features and advantages of the present invention will become apparent to those skilled in the art from the following description with reference to the drawings, in which:

Fig. 1 shows a high level sequence diagram including a Message Distribution Center (MDC) enabling a Content Provider to direct messages via SMTP to the Message Distribution Center (MDC), in accordance with the principles of the present invention.

Fig. 2 illustrates exemplary software components and their relationships in an embodiment of a message distribution center (MDC), in accordance with one embodiment of the present invention.

Fig. 3 is an exemplary class diagram which shows further details of an embodiment of a Message Distribution Center, in accordance with the principles of the present invention.

SUMMARY OF THE INVENTION

In accordance with the principles of the present invention, a message distribution center is interposed between a source of a short message and a wireless network including an intended recipient of the short message. The message distribution center comprises an SMTP protocol communication channel to receive the short message from the source of the short message. A plurality of subscriber queues are included, each corresponding to a different subscriber in the wireless network. The short message is placed in at least one of the plurality of subscriber queues before delivery to the wireless network. A communication channel communicates the short message to the wireless network.

In accordance with another aspect of the present invention, a method of throttling short messages to subscribers in a wireless network comprises forwarding a short message to a wireless network only when a receiving wireless device in said wireless network is known outside said wireless network to be online.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

The present invention enables a Content Provider to direct messages via SMTP to an intermediatary Message Distribution Center (MDC) using standard SMTP Gateway and other well-known protocols.

In accordance with the principles of the present invention, short messages are inserted in the MDC into individual queues for each subscriber, and the provider is informed through conventional SMTP protocol messages that the short message has been accepted.

If the carrier has specifically disallowed service for a MIN (e.g., in the case of churning), then the content provider is informed through an SMTP interchange that the recipient is invalid. This encourages providers to discontinue service to terminated MINs, thereby reducing traffic to the MDC.

A Message Distribution Center (MDC) provides value to both wireless developers and wireless carriers. For instance, for the Wireless Developer, an MDC provides a single mechanism for interacting with subscribers of multiple carriers, regardless of each carrier's underlying infrastructure. For the carrier, an MDC can protect their SS7 network by intelligently throttling messages and configuring message delivery parameters to be more network friendly.

An MDC acts as a broker between carriers and developers. Different levels of relationships can be established with both carriers and developers, resulting in different levels of services that are available. The MDC interacts with a carrier's Short Message Service Center(s) (SMSCs) and/or SS7 network, allowing developers to guarantee message delivery, to interact with users via Mobile Terminated (MT) and Mobile Originated (MO) SMS, and possibly even to receive handset presence information.

Although the disclosed embodiments relate primarily to wireless services from the perspective of a Short Message Service (SMS), the disclosed MDC and related management middleware may support many types of wireless devices using the same API. For instance, suitable supported devices may include, e.g., 2-way Email pagers, the Palm VII™, and wireless application protocol (WAP) devices.

The disclosed MDC utilizes a Wireless Internet Gateway (WIG), which is a middleware messaging platform designed to facilitate communication between Internet devices and various wireless networks. A suitable WIG is disclosed in U.S. Appl. No. 09/630,762 to SMITH,

entitled "Wireless Internet Gateway", filed August 2, 2000, the entirety of which is expressly incorporated herein by reference.

Fig. 1 shows a high level sequence diagram including a Message Distribution Center (MDC) enabling a Content Provider to direct messages via SMTP to the Message Distribution Center (MDC), in accordance with the principles of the present invention.

In particular, as shown in Fig. 1, an MDC **100** is placed intermediary between a content provider **120** and a wireless carrier **130**, to allow management of message delivery for each of a plurality of subscribers. As shown in Fig. 1, the content provider **120** communicates with the MDC **100** using SMTP protocol messages, and the MDC communicates with the wireless carrier **130** preferably using RMI/SMPP techniques.

Importantly, the MDC **100** includes a plurality of subscriber queues **150**, preferably one for each subscriber having MDC support. The subscriber queues **150** may be integrated within the gateway of the MDC **100**, or may be external to the gateway of the MDC **100** but nevertheless in direct communication with the gateway of the MDC **100**.

The subscriber queue **150** preferably follows a First In First Out (FIFO) model, where the oldest messages are delivered first.

In accordance with the principles of the present invention, a particular wireless carrier **130** assigns a value for the maximum number of outstanding messages for a particular subscriber. This maximum number of outstanding messages can be used to establish a queue threshold. Thus, if one or more new messages cause the queue threshold to be exceeded, then the oldest messages may be deleted first from the particular subscriber queue **150** to make room for the new message(s). Of course, the subscriber queue **150** may be expanded in size as desired.

To provide protection from constantly growing subscriber queues **150**, other rules may be established by the wireless carrier **130** to

allow automatic deletion of particular messages from the subscriber queue **150**.

For instance, an expiration period may be established whereby all messages more than x days old are removed. The expiration period may be established, e.g., on an individual subscriber basis (e.g., different subscription plans allowing larger queues and/or longer storage times), or on a global basis (e.g., all subscribers in a particular wireless network have a similar expiration time).

The use of automatic deletion of short messages from subscriber queues **150** is important, e.g., in the case of churned MINs, so that a new subscriber does not receive lingering messages from a previous subscriber with the same MIN.

Short messages to subscriber queues **150** may be delivered independently from one another and/or message delivery times spaced apart, thereby distributing message load over time and minimizing the negative effects of batch messaging on the wireless network.

The MDC **100** can also or alternatively be configured to avoid sending batch messages during the carrier's busy hour(s), thereby minimizing load pressures on the wireless network.

The use of an MDC **150** can aid the wireless carrier's network significantly, e.g., by forwarding short messages only when the relative handsets are turned on. Under this scenario, subscriber queues are not processed when the handset is powered off. This can reduce network storage requirements, delivery retry attempts, and overall SS7 usage. The MDC **100** can do this either by interacting with appropriate applications, e.g., with a mobile chat location register (MCLR), or generally by intelligent use of SMS delivery receipt data from the SMSC and Web Gateway. A suitable mobile chat location register (MCLR) is shown and described in U.S. Appl. No. 09/814,363, entitled "Wireless

Chat Automatic Status Tracking", filed March 23, 2001 by Ung et al., the entirety of which is expressly incorporated herein by reference.

The MDC **100** can further be configured to send content from various providers to certain SMPP ports on a short message service center (SMSC). The receipt of such content allows distinct billing records to be generated for each type of service, e.g., ads, general content, premium content, etc.

Fig. 2 illustrates exemplary software components and their relationships in an embodiment of a message distribution center (MDC), in accordance with one embodiment of the present invention.

In the disclosed embodiments, a Wireless Internet Gateway (WIG) was modified to include another 'dev/null' destination, which acknowledges short messages from a queueMonitor, but does not actually process them. The short messages remain in the *Messages* table of the database, where they are retrieved by a software component referred to herein as an "Intelligent Delivery Agent" (IDA). The IDA retrieves messages from the *Messages* table in the database for subscribers, e.g., when they power on their handsets, subject to any desired rules. The IDA can become aware of subscriber power-ups through any appropriate trigger, e.g., via an SMPP Delivery Receipt mechanism, through Mobile Chat Location Register (MCLR) software, etc. Preferably, the IDA throttles short message traffic to any or all subscribers, e.g., optionally waiting until the busy hour is over before beginning the transmission.

The MDC Gateway **100** may be, e.g., a standard WIG to which the provider sends messages through SMTP, RMI, HTTP, or suitable middleware software. As shown in Fig. 2, the MDC **100** includes a new *DummyDestination*, which simply acknowledges receipt from a particular subscriber queue **150**, but does not attempt delivery. Delivery may be accomplished through an Intelligent Delivery Agent process,

which polls a messages table that is populated when the MDC Gateway **100** receives relevant short messages.

To most efficiently use the MDC gateway **100**, the SMTP session preferably assigns the msgType property based on the sender's Email address and using *InfoProviders* information from the database. This allows the MDC Gateway **100** to determine that SMTP messages from an Information Provider (e.g., INFO@NEWS.COM) should use the Dummy Destination and be queried by the IDA. If the short message is submitted via an RMI mechanism, then the sender will explicitly define the msgType.

When the MDC **100** inserts a short message record, an Oracle™ trigger may be used to create a subscriber record in the *Subscribers* table in the database if such a record does not already exist for the recipient.

The *Subscribers* table may contain, preferably at a minimum, a MIN, status (e.g., 'Online', 'Offline', 'Unknown'), and the time of the last status update. When first created, the status may default to 'Unknown'.

The IDA may be a separate program that delivers messages from the database to appropriate recipients via a RemoteSMPP RMI Interface of the carrier's gateway. The IDA preferably determines subscriber availability via, e.g., an MCLR or via Delivery Receipts. The former approach is likely more efficient, but the latter approach is more likely to work with most carrier environments.

The Delivery Receipt method is considered to be more complicated. The Delivery Receipt method attempts to find the status of a subscriber's handset by examining delivery receipts from messages sent to the subscriber.

As shown in Fig. 2, a *SubscriberPoller* agent **202** starts the process by gathering a list of subscribers from a *Subscribers* table **214** at

some time interval (z). If a particular subscriber is online, then the *DeliveryAgent* object **210** is notified.

The *DeliveryAgent* **210** then gathers some pre-configured number of messages in time order for the subscriber from the *Messages* table **228** in the database, and sends them to the *Carrier gateway* **238** for delivery to the subscriber. There is no delivery receipt associated with these messages, so if the subscriber's handset is turned off the short messages are not delivered and not resent. This is why it is preferred that only a pre-configured number of short messages be sent before the subscriber's status is checked again by *SubscriberPoller* **202**.

If a subscriber's status is unknown, then a *DRDeliverAgent* **234** is notified to send one message via the *Carrier gateway* **238** to the subscriber with a delivery receipt requested. When it sends the message, it sets the subscriber status as offline so that the *SubscriberPoller* **202** will ignore that subscriber.

The delivery receipt will arrive at *DR Listener* **208**. If the delivery receipt indicates failure, then the subscriber status is set as 'unknown', otherwise the subscriber status is set as 'online'. The *SubscriberPoller* **202** wakes up shortly thereafter to take advantage of the user going online.

Because there is no direct feedback from the handset, there is no conventional information received when a handset is turned off or on. *DBSubStatusResetter* **204** makes assumptions about how long a handset typically stays on or goes off. If a handset has been marked as online for a period of time (x), then *DRSubStatusResetter* **204** sets the corresponding subscriber status to 'unknown', which will restart the delivery receipt cycle again. If a subscriber has been marked as 'offline' for a different period of time (y), then the subscriber is marked as unknown, again restarting the delivery receipt cycle.

To summarize, there are three time periods involved in the Delivery Receipt method. Time x is the average time that a handset is online. Time y is the average time that a handset is offline. Time z is how often the Subscribers table **214** is polled for a list of subscribers.

The three periods mentioned (x, y, and z) must have a certain relationship to one another. Time z must be smaller than time x and time y. Time x and time y's relationship to one another doesn't matter. Time z must be smaller than time x so that when a subscriber goes online, messages are sent to it before time x expires and online subscribers are set to 'unknown'. Time z should be smaller than time y, otherwise the subscriber will be sent another message before DR Listener **208** has had a chance to receive the delivery receipt. This implies that time z will also be longer than the expected time for a delivery receipt.

A *SubscriberCleanUp* agent may be implemented to clean out subscribers that haven't had messages sent to them for a pre-defined period of time. This will ensure that the subscriber database doesn't grow without bound. Subscribers may have taken their name from the information provider's subscriber list.

Another technique mentioned above is to use an MCLR facility. In this situation, the MCLR will know explicitly when a handset is turned off or on. The *MCLR Listener* **218** then updates the *Subscribers* table **214** accordingly. The *SubscriberPoller* **202** always sees only online subscribers. It then uses the *DeliveryAgent* **210** to send the messages without a delivery receipt requested.

When the *MCLR Listener* **218** is active, then the *DRDeliverAgent* **234**, *DR Listener* **208**, and *DBSubStatusResetter* **204** are all inactive. When the three delivery receipt entities are active, then the *MCLR Listener* **218** is inactive.

The *IDA Main* **232** activates appropriate facilities based on a configuration file.

In an MCLR implementation, the *DRDeliveryAgent* **234**, *DR Listener* **208**, and *DRSubStatusResetter* **204** may not be used.

Fig. 3 is an exemplary class diagram which shows further details of an embodiment of a Message Distribution Center, in accordance with the principles of the present invention. In particular, Fig. 3 shows exemplary classes that may be activated and used to determine subscriber status and to actually deliver messages.

As shown in Fig. 3, an *IDA* main class **318** is responsible for deciding which subscriber status determination strategy to use. The IDA class **318** may receive this information from a configuration file. The IDA class **318** instantiates and activates an *MCLRListener* class **314** if that facility is to be used to retrieve a handset's online/offline status. If the strategy is to use delivery receipts, then the *IDA* class **318** instead instantiates and activates the *DRListener* **322** and *DRSubStatusResetter* **316** classes.

A *SubscriberPoller* **306** class gets a list of subscribers whose status is 'unknown' or 'online' from the database. If a subscriber's status is 'unknown', the *SubscriberPoller* **306** invokes a method in a *DeliveryAgent* class **302** to send a message requesting a delivery receipt. If the subscriber's status is 'online', then the *DeliveryAgent* **302** sends messages without a delivery receipt to the subscriber.

The *DeliveryAgent* **302** is responsible for averaging out the load on the carrier's system. It may do this by spreading out the messages over time, allowing normal traffic to be sent more quickly. The *DeliveryAgent* **302** may also hold off sending batch messages during the carrier's busy time. This information may be maintained in a configuration file and retrieved through a *DeliverySetupInfo* class.

The *DeliveryAgent* **302** can also be configured to send messages over certain SMPP ports to the carrier gateway **238** for tracking the amount of traffic that an information provider is sending. The

DeliveryAgent **302** may accomplish this by tagging the message with a message type indicating that it is an MDC message. The configuration file may be set up so that messages of an MDC type will be sent to certain SMPP ports by the carrier gateway **238**.

Both the *Subscribers* **300** and *Messages* **304** classes may be wrappers around their respective database tables, to isolate JDBC calls to these classes only and/or to place the data in a useful format.

The IDA **318** may send messages and/or decide blackout periods on a global basis, i.e., regardless of the destination of any particular message. One enhancement to this is to apply these on a per-carrier basis since carriers can be in different time zones or have more or less capable hardware.

One advantage provided by the present invention is that SMTP is a well-known protocol and an easy way for content providers to distribute their information.

A Message Distribution Center (MDC) in accordance with the principles of the present invention provides an ideal solution. It addresses the problems faced by the carrier without requiring the information providers to change technologies.

The principles of the present invention have applicability for usage with wireless intelligent network (WIN) and SMTP applications, e.g., those already otherwise containing a Internet gateway application for routing information through an SMTP gateway. Moreover, the MDC allows content providers to continue with their current mode of operation without placing the carrier's network at risk. The MDC can receive messages using a variety of protocols, including SMTP. It automatically routes messages to the appropriate carrier based on MIN range. Instead of delivering SMTP content directly to the carrier, it is delivered to the MDC. The MDC then ensures that the content is delivered in a 'carrier-friendly' manner.

MDC can provide the Info Provider with delivery statistics, e.g., what percentage of messages are being delivered.

The MDC helps prevent the carrier from being overwhelmed by bulk messaging content and provides the following benefits:

- bulk message traffic is distributed across time
- messages are delivered over more efficient protocols than SMTP through the carrier's Wireless Internet Gateway
- messages are only delivered when handsets are on, thereby eliminating network storage and retries
- messages are delivered with appropriate urgency, delivery receipt, expiration times, and billing identifiers
- individual bulk message queues allow the carrier to limit the number of messages that can be queued per subscriber
- bulk messaging can be disabled for individual accounts when subscribers churn
- bulk message delivery statistics are available to the carrier via a web interface.

While the invention has been described with reference to the exemplary embodiments thereof, those skilled in the art will be able to make various modifications to the described embodiments of the invention without departing from the true spirit and scope of the invention.